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ABSTRACT

This report contains summaries of various portions of a conference dealing with preparing technicians for various agricultural occupations as well as the texts of several papers presented at the conference. The keynote address, "Technology for the 21st Century" by John A. Conrads, is presented together with the following reaction panel papers: "Teacher Educator," by Jasper S. Lee; "Technical College Faculty," by James L. Gibson; and "Technical College Administration," by John L. Light. Provided next is a brief summary of the conference's technical sessions. The following technical session reports are included: "Articulating Technical Education: Four-Year College Perspective," by Bernard Erven; "Articulating Technical Education: Two-Year College Perspective," by Larry L. Statler; and "Articulating Technical Education: Industry Perspective," by Louis Hathaway. The major conference address, "Teaching Technicians for the 21st Century" by William E. Drake, is presented. Included next are the following three group discussion summaries: "Developing Action Plans: Technical College Faculty," by Linda Houston and Kirby Barrick; "Developing Action Plans: Technical College Administrators," by George Waldheim and Lowell Hedges; and "Developing Action Plans: Teacher Educators," by Richard Welton and Barbara Malpiedi. A conference summary by J. David McCracken concludes the volume. (MN)

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PREPARING TECHNICIANS FOR THE TWENTY-FIRST CENTURY IN AGRICULTURE, AGRIBUSINESS, AND NATURAL RESOURCES

Summary Report of a Conference
Held in Columbus, Ohio
April 15-16, 1985

Edited by
Arnold L. Mokma and Kirby Barrick

Department of Agricultural Education
College of Agriculture
The Ohio State University

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PREFACE

The conference would not have happened without the support of several individuals.

Dr. Stanley Burke -- for his ideas and perserverance in the initial stages of planning this conference.

Dr. Dan Garrison -- for his support of the necessary planning involved.

Dr. J. Robert Warmbrod -- for his encouragement to take leadership in teacher education for improving instruction at the postsecondary, technical college level.

Dr. David McCracken -- for his willingness to observe, summarize and evaluate the conference program.

Dr. David Munn -- for his encyclopedic note-taking skills for preparing the proceedings document.

Jackie Baker, Connie Rice, June Young -- for their skills and patience in providing the secretarial support necessary for this type of activity.

Marilyn Mokma -- my wife, for her constant encouragement and willingness to accommodate late hours and missed family functions.

Finally, this conference would not have occurred without the funding support provided by the Research and Graduate Education Committee of The Ohio State University College of Agriculture.

Arnold Mokma
Conference Coordinator

INTRODUCTION

Arnold L. Mokma

This conference is a result of a brainstorming session in my office with Dr. Stanley Burke who is now at Virginia Polytechnic Institute and State University. He and I were sharing our mutual concerns over the need to get technical college faculty together to discuss future directions and needs in technical postsecondary agricultural education. Our concern also focused on the fact that one institution and one state could easily have become "inbred" in their thinking during the last four to five years. Therefore, we desired to develop a program that would be regional (multi-state) and would have major involvement of industry representatives as well as educators.

For six years, since Dr. J. David McCracken was president of the American Association of Teacher Educators in Agriculture, I have served on an ad hoc committee to address these in-service needs for people in postsecondary agriculture faculty positions. When Dr. Burke read a memo circulated to The Ohio State University College of Agriculture faculty calling for proposals to improve graduate education, we modified our earlier brainstorm to determine the "match" between our interests and the goals of this request for proposals. We decided there was a high degree of compat-ability so it was worth our efforts to prepare a proposal.

Once the proposal was approved, we established an advisory council to help us refine our thinking. For this, we involved industry representa-tives, technical college faculty, the Ohio Board of Regents, the Ohio Advisory Council for Vocational Education, and, of course, faculty and administrators of The Ohio State University. The value of their help will be measured by the success of these next two days.

The conference we have planned proposes to be a microcosm of the best of times and the worst of times in technical education: the best of times because industry is enthused about the opportunity to be involved with us educators as we look toward the future; the worst of times because we as educators could leave here with the feeling of hopelessness in the availability of resources to support our attempt to meet industry's skilled manpower needs, let alone get ahead.

With the well-accepted college role of preparing technicians, middle-managers or para-professionals, we should be a gateway to the future rather than a window to the past. Industry constantly is seeking people who can <u>do</u>, and <u>analyze</u>, and can <u>decide</u>--employees with a well-rounded knowledge of the practical as well as the theoretical, scientific aspects of agriculture. In our universities we often hear of the "publish or perish" rule due to the emphasis on research and publication. At the technical colleges, we should adopt the "produce or perish" rule--produce employable graduates or seek other employment. In short, we should be leading rather than following the technological advancement of industry. This conference is a start to better understand industry's needs for the future.

Dr. Arnold Mokma is an assistant director of the Agricultural Technical Institute, Wooster, Ohio, and associate professor in the Department of Agricultural Education, The Ohio State University, Columbus, Ohio.

PREPARING TECHNICIANS FOR THE 21ST CENTURY

MONDAY, APRIL 15

9:00 Welcome and Introductions

9:15 **"Technology for the 21st Century"**
Mr. John Conrad, Manager
Reliability Division
John Deere Tractor Works

10:30 **Reactor Panel**
Dr. Jasper Lee, Professor and Head
Dept. of Agricultural Education
Mississippi State University

Dr. James L. Gibson
University of Minnesota
Technical College at Waseca

Dr. John Light, President
Hocking Technical College, Ohio

11:45 **Luncheon (included in registration fee)**

1:15 **High Technology in the Agriculture and Natural Resources Industry**
Production Agriculture
Eli Lilly Company, Greenfield, Ind.
Ornamental Horticulture
O. M. Scotts, Marysville, Ohio
Natural Resources
Donelson Hardwoods, Inc., Wooster, Ohio
Agricultural Mechanics
Lincoln Electric Co., Cleveland, Ohio
Supply and Service Business
The Anderson's, Maumee, Ohio

3:15 **Articulating Technical Education**
Dr. Bernard Erven
The Ohio State University

Dr. Larry Statler
Kirkwood Community College

Mr. Louis Hathaway
Deere and Company

4:15 **One State's Experience**
Dr. Earl Russell
Dr. Charles Olson
University of Illinois

5:00 **Adjourn**

TUESDAY, APRIL 16

7:00 **Breakfast (included in registration fee)**

"Teaching for the 21st Century"
Dr. William Drake
Professor and Coordinator
Agricultural & Occupational Education
Cornell University

8:30 **Developing Plans for Action**
Dr. Richard Welton
Agricultural Education
Kansas State University

Ms. Linda Houston
Agricultural Technical Institute
The Ohio State University

Dr. George Waldheim
Div. of Business, Engineering & Science
Muskingum Area Technical College

10:30 **Conference Summary**
Dr. David McCracken
Department of Agricultural Education
The Ohio State University

11:30 **Adjourn**

KEYNOTE ADDRESS: TECHNOLOGY FOR THE 21ST CENTURY

John A. Conrads

I really feel like I'm among friends. Many of you I know very intimately; I work with you; I'm dedicated to the same task you are but in a somewhat different fashion.

What we're trying to do is look at technology for the 21st century. From the time the Indians roamed the prairies until settlers came from other nations, everybody brought their own ideas and experiences including the mistakes. The role of the American farmer has changed dramatically over time but especially in the last 50 years. Farming has changed from labor intensive drudgery to an approach using technological development.

North America was not an area blessed with an abundance of natural plants or animals suitable for agricultural exploitation. Other than corn, a few varieties of beans and lots of prairie grass and trees, there wasn't a whole lot for the settlers to start with.

The unknown soil conditions and climatic environment added to the challenges. From soybeans, to alfalfa, cotton, grapes, etc.--new plants were imported and acclimated. Almost every plant could grow in this land because of the wide variation of climate. Over the years, these plants have been refined to further improve their productivity.

Also, consider the agricultural infrastructure. We talk very little about it, but every road and railroad is part of that infrastructure. The very fact America can become a net exporter of agricultural commodities is due to the fact we have good roads--a good transportation system--all the things we often don't link with agriculture. Without this, agriculture would be dead. We don't send enough, but we are a major supplier of grains around the world.

Concurrent with this plant introduction, there was the introduction of science and research to speed the total agricultural development. Without the research--without people of academe--much of this development wouldn't have happened.

Today the United States has the most advanced and productive agricultural system of the world. It's the nation's largest single business but highly decentralized. Alfred P. Sloan once said when General Motors had reached the pinnacle of success, "It is easier to become Number One than stay Number One." We need to listen to that admonition because we have syndromes that are not right. America's agriculture, if it wants to stay Number One, is going to have to scramble.

Where do we go from here? It would be a serious mistake if we leave the long term strategy of government involvement with agriculture because there are some signs of an economic downturn. We've been through depressions before. There have probably been more crises than good times. But over the long term we have come out stronger, more productive, more competitive, more equipped to weather the storm. We need to be strategists, we don't need quick fixes. We need to determine where we're going on a long trend line.

We need to highlight greater management skills in agriculture. The only way American agriculture can succeed and continue to be a force in the international market for the 21st century will be through technological advancements. Obviously the computer, or electronics in general, will play a major role. What we really need to do, instead of continuously refining what we already have, is to throw away some of our current items and start over. We need to be revolutionary in thought--we need to break with the past. The past wasn't necessarily bad but it no longer fits in where we have to go in the future.

In our machinery we will see more functions controlled by automatic systems. Already we are seeing an abundance of hydraulics and electronic gear on some machines but that is only the start. Before the end of this century, such machines as combines and planters will be so self-sufficient in their operation that they are approaching the capability of industrial robots. We really are entering an era of "agrobotics." The only thing holding us back now is the quality of the sensors. But that's going to get solved in the next few years.

Where is your school system today? Have you got a program that deals with agrobotics? That's the question--you answer it. Or are you still teaching on a Model M International? Where are you with your program?

Complex information gathering and distribution devices will become part of the modern competitive farm in the next century. They will interface with modern surveillance satellites that will tell us where the crops are being grown and if there is a good or bad harvest. The new weather satellites will have direct input into the farm office to predict the best time for tilling, for planting, for disease and weed control, for harvesting, etc. They will work with a computer to give us a long term trend line. Is anyone here thinking of that in teaching young people? You answer that question!

Let me give you a scenario I dreamed up as the picture of the farm in the 21st Century. The farmer sits in his office surrounded by electronic gear. He pushes a few buttons and out of his machine shed comes a John Deere Ultra Trac Power unit. The doors opened automatically and this power unit automatically links up to the new pulverizing mechanism that has replaced the moldboard plow. (The settlers brought the plow and the Bible. They should have brought the Bible but left the plow!)

The central guidance system directs the machinery to the right field to start the day's work. "Nurse" vehicles are dispatched to the fields to automatically replenish the fuels, chemicals, seeds and other supplies while the "combo" keeps on working. In a one pass operation the field is tilled and planted.

During harvest, things really get moving because of the game to beat the weather and the market. What was once a noisy operation is now a quiet hum as the "combos" move to the fields with their laser cut crop headers and ultrasonic separators. "Tube buggies" accompany the harvest unit and when filled return to the farm office. Here they enter a "tube terminal" where they travel at speeds over 500 mph to the nearest grain terminal.

While this is happening, the farmer in his office is linked into the worldwide marketing situation. A quick decision is made on how to market the grain and, while he's getting paid, he learns of a good fertilizer purchase so he diverts some of the grain sale proceeds to the fertilizer purchase.

Crop surveillance satellites will tell us, in advance, what the crop conditions are around the world and relay the information to the farmer. He then decides what crops to plant and how many acres, the best cultural practices to apply, the best time to harvest, the best time to market and purchase supplies for next year. All this while enjoying his coffee in an air conditioned office!

In talking to Farmer Brown, he indicated he had just booked a flight to the newly opened agricultural experiment station on the "Celestial II" space station. He is typical in saying, "You never know what they are coming up with next. I need to know so I can make the best decisions."

A wild scenario? Maybe, but these are some of the things that are being developed or thought of at this time. Many of these things are already in operation in other sectors of our society. Who would have thought of 180 bu/acre corn or 400 horsepower tractors or 24 row electronically monitored planters? All of these no-human-touch systems are not that far away.

What amazes me is how quickly change happens. It doesn't happen over a long period of time. Each one of us in this room is already behind! You have the obligation to teach students or teach teachers who teach students. Now, if you're behind and your message is going to get filtered, what is the message the student gets? What is the message to the student to be prepared as a valuable, effective, useful member of the 21st Century?

The German statesman Bismarck once said "Knowledge is power." If we in the U.S. want to continue to be powerful in agriculture, we just need to have more knowledge. We have many good things going for us--people from all around the world brought the best to this country and all worked hard. It's a tremendous experiment that has worked--a melting pot. But what we don't have is deep pervasive cultural roots. We need to start thinking about getting ahead--move forward. Since we don't have these roots, we need to build a society, particularly in agriculture, that looks forward and continues to "hang in there." We are not down and out: the best days are still ahead!

The future is here right now. No generation is ever prepared well enough for the future. It always arrives too soon. Today with all the technological development the future arrives all too fast.

What we need is a lot of academicians. We need people who will work on the forefront, people who will do research--but what we really need is people who can put that research and its results into work. That's where vocational/technical education comes in. One of the things that

brought Germany and Japan back after World War II was not their academicians, but this enormous cadre of highly trained technicians who were prepared by the vocational education system and deeply ingrained in their culture. We don't have much of a culture. One missing link is a good old-fashioned apprentice system. There is no opportunity for a person to learn the business from the start. We're trying to fill the gap by vocational schools, community and technical colleges and other kinds of vocational training. We need more and more of this.

Today, at John Deere, it's easier to hire graduate engineers than a first-class mechanic. Should that be? Hardly. We need more vocational training in all areas. In other countries you see the real downfall when you don't have adequate vocational programs preparing trained people. In Uganda, when I was there, the German company, Deutz, had sold 150 tractors, 90 of which were on the "bone pile" because there was no one to fix them. There were engineers in Germany to design them, there were fast-talking salesmen to sell them but the system failed because there were no vocationally prepared technicians to repair them. Getting closer to home, the digital tachometer on John Deere combines is often returned because it's faulty. Over 80% are not faulty, but the person is not able to check out a wiring circuit and so it's returned. Anywhere between 40 and 80% of the electronic instruments on John Deere equipment that are returned under warranty claim are not faulty. They are returned only because the technicians can't troubleshoot them because they have not been taught properly. Can you imagine the cost to society? Think of washing machines, automobiles, aircraft, etc. This is a price we, as a nation, pay because we've not dedicated ourselves to a nation wide effort of bonafide vocational education.

It is my observation that vocational education always lags behind the technological state of society. We have state of the art engineering, but we sure don't have state of the art fixing. I still see agricultural mechanics being trained on 30 year old tractor models and combine components instead of new, highly complex hydraulic, electrical, electronic systems. What's being taught in other areas--crop production, new tillage systems, weed and pest control, animal husbandry, etc. How about teaching marketing or investment and business management of farms? Why are so many farms in bad financial shape today? Most of them are in trouble because they didn't have a good business plan--probably they're good farmers but not good businessmen. Can the future agribusinessman afford to be out of touch with the world scene? Are we teaching young people that they're world citizens--that their well being may be influenced by what's happening in the Soviet Union, France, Italy, Libya, etc.? Are we teaching that kind of world vision?

The National Agriculture Forum 1985 says "The vision of farming held by policy makers in agriculture itself must be revised." I'd like to paraphrase it by saying: the vision of agricultural educators must be revised. Is that fair? It fits in the context. We need to revise our thinking. As I said earlier, all of us are out of touch!

Someone once said "Youth looks ahead, older people look back and middle-aged people look worried." We are in the middle-age and we should be worried because today we have a lot that does not fit the marketplace.

How do we sell products? First of all its aesthetics: Think about our product, what do we teach students about aesthetics--to be tidy; to be on time; to be a neat person? What's the next thing we sell our goods on? Reliability. What's reliability in a student? To be punctual, do

work right, don't steal, be accountable, etc. There are several qualities like this. You have lower enrollments but you can't place everyone. Have you produced a product that's saleable? Think about it for a minute--is your product saleable, is it effective, does it do the job? Thirdly, you have function. Do you teach students that there's no perfect job so they need to be prepared to hang in there in tough times? Then you must consider cost--do you teach the student that they won't necessarily be a foreman immediately. You have to learn the skill . Then if you prove yourself, you can become the foreman. All of these things are your products. Students must be taught that they are part of the agricultural infrastructure. They may go into seed, feed, marketing, transportation, etc.--all areas that are vitally linked to American farming.

Should we also teach foreign language to those interested in marketing? One of the biggest problems we have is our dependence on foreign interpretors to give us the message. The Japanese are successful because they speak English when they come here. The American farmer is a part of our worldwide society, not isolated to one county or state! We need to understand and accept this change in our thinking.

Above all, we have to realize that there is a technology explosion around us and things change at an ever increasing speed. By the time we, at Deere, install a computer system, it is already obsolete. By the time we master a skill, it is almost obsolete. Can you imagine your students being obsolete every five years? Have you been retrained within the last five years or is your attitude "Heck, I've got tenure?" In academe the slogan is "publish or perish." Well,you may have to perish. It needs to be emphasized over and over to our students that they need to be retrained every five years!

When you leave college, you get a sheepskin which you put on your wall. What do you do to stay in touch with all this change? There's a deficiency in all of us. Are you going into the classroom confident and competent? Be careful that you don't get hollowed out. The students will find you out pretty quickly. You are producing a product; maybe your slogan should be "produce or perish." I sincerely believe that a teacher who is behind cannot lead students ahead.

Much soul searching must go on in the education community because it will require vision and qualification. Vision is a wonderful thing. There's a Biblical statement that says "Without vision people will perish." If we don't have vision, we'll all perish because we're not contributing to this fast moving environment. Vision is the key word.

In addition to vision we need mission. Mission is something you'll do no matter the circumstances. The young people you educate must be taught up-to-date stuff with an emphasis on stretching out to grasp the future, because the future is right here. Anything less than this will catch them unprepared for their whole lifetime!

The students you teach today will have 40 years ahead of them. Look back 40 years in your life and think about all that's happened in the way of change. Are we preparing people for 40 years of effective service to agriculture?

Some people take the approach it can't be done. Someone once said "If you say it can't be done, you'll probably be interrupted by someone already doing it." We see that occurring with many of our foreign competitors.

We also need some emotion and enthusiasm. Nothing worthwhile has been done without these. Enthusiasm defies mathematics--when you divide it, it multiplies! So a missionary zeal is very important.

I want to leave with you six things:

1. Be a STUDENT. It's very important teachers remain students. You can teach an old dog new tricks. The problem lies with the dog not the teaching.
2. Be a DREAMER. Everything in life starts with a dream. Martin Luther King said "I have a dream!" Let's dream that today and tomorrow you and I make a difference. But, let's work to fulfill that dream.
3. Be a PLANNER. You've got to plan what you want to be.
4. Be a WORKER. Some people believe in luck, but put your shoulder to the wheel, because the harder you work, the luckier you get.
5. Be a BELIEVER. Each of us is a limited edition--there is no one else exactly alike. We can make a contribution right where we are. No one can do it for you. Believe in yourself, in God, your fellowman but, most importantly, believe that it can be done.
6. Be ALIVE. Be a live wire, be enthusiastic, display to the people that what you are doing is important to you.

Mr. John A. Conrads is manager of reliability for The John Deere Tractor Works, Waterloo, Iowa.

REACTION PANEL: TEACHER EDUCATOR

Jasper S. Lee

Recently I read that today each farm worker produces food for 80 people. This number keeps increasing all the time. For each farm worker we have over seven people in agricultural supply, service, processing, etc. The real concern should be, are we preparing enough people as well as are we giving them the correct, technically up-to-date skills?

Should we be teaching more basic principles in a general education approach and let industry do the specific training? A few years ago there was a national effort to develop a list of competencies needed by agricultural workers. The problem is that competencies are bound by the state of the art in place at the time the study is completed. It seems that society would be better off if we, in education, provided the general principles and taught people how to learn so they can stay up-to-date on their own.

In our postsecondary institutions teaching agriculture, we need degreed people who are also certified. I'd propose they should be certified following the elementary and secondary school format. This way we know that the technical fauclty member not only has an area of agricultural expertise but also has the general education background to teach basic principles.

The students in our classes today need "learning for learning" if they are to keep up with the technological change of tomorrow.

Dr. Jasper S. Lee is professor and head of the Department of Agricultural and Extension Education at Mississippi State University, Mississippi State, Mississippi.

REACTION PANEL: TECHNICAL COLLEGE FACULTY

James L. Gibson

There is no question that we, as educators, are aware of the direction that technological innovations and their applications may allow us to travel into and throughout the 21st Century. George Orwell's 1984 predictions have come true, in a sense, and we recognize the speed with which the future--the tomorrows--emerge as todays and fade into yesterdays.

Our main goals as educators are to have our students job ready upon completion of a prescribed program of study, motivated and able to choose a pattern of continuing educational development that will enable them to keep up with changing technology, and prepare for career growth. To be on the cutting edge, we continually look for signals which may help us identify those emerging needs that could best be filled by persons who would benefit from the necessary technician level preparation.

The challenges we face in our daily work, however, are much more complex than just keeping up with technological change. We are constantly torn between two fundamental concepts in education: mastery and value-added. If we take a mastery approach to student learning, we find ourselves with a focus upon the here and now. We decide what students must be able to do to enable them to pass their big test--their first job--and then we teach for that test.

If, on the other hand, we look for general directions in which our students should go in their educational preparation, we find ourselves "adjusting" our standards, and our quality control becomes as variable as our "open door admission policy." In the short run, we as teachers are measured by the number of students who pass through our course and who receive passing grades.

The learning continuum: a) awareness, b) knowledge, c) use of knowledge, and d) ability to teach, for us is a given. Our graduates, if we are to be truly successful, must have the ability to use their knowledge in the daily performance of their jobs. Not only that, but they must develop those communication and managerial skills needed for career growth and, therefore, must be able to teach others the substance of their own knowledge. Technicians must utilize the highest levels of integrative mental processes and human relations ability to develop their niche on the team between the top management and the semiskilled or skilled work force.

The challenge we face, as educators, is the variability of our input. Open admissions policies are a fundamental part of public higher education. We respond to the national need for adding value to our human resource. But, as we are all very aware:

A. Our traditional students make the commitment to higher education in their later high school years. They, by and large, are not the academic type. Or, at least, they did not want to appear that way too early. Their high school course work may not have included emphases in science, mathematics, or communications; and their problem solving and learning skills may not be developed.

B. Fewer high school graduates have had farm and or vocational agriculture education experiences.

C. Short range thinking about possible career opportunities in agriculture occupy the mental set of most of the significant others who influence high school graduates. The non-desirability of an agriculturally related career means fewer applicants, fewer students and, thus, fewer graduates from our programs.

We are expected to inculcate young people with a very wide range of academic needs and educational/career aspirations. The spectrum widens: to the left we are being called increasingly to compensate for poorer preparation in basic learning skills; to the right to accommodate increasingly complex agricultural technologies. However, we do have on our side the rapid psychological maturation that occurs the first two years after high school and an increased seriousness of purpose among those who enroll in our technical programs.

Many of us choose a middle of the road approach between mastery and value-added. It is our job to prepare students with the tools needed for job entry and the motivation to build a career path based on a high level of job performance, continuing study and opportunity management. There is no way that we will ever be able to simulate in our classrooms and laboratories all of the diverse dimensions of agriculture and agribusiness in which our students may become involved. Our institutional resources will always be too scarce.

While it was once apparent that the terms technician , paraprofessional , and midmanagement were nearly synonymous, today it is not so clear these terms will remain descriptive of the two-year postsecondary graduate. Technicians will be highly educated in the appropriate technologies within which an uncertain career ladder will give way to the career lattice, where lateral rather than vertical movement is the rule. The distance between top management and worker may be described in the future by only a two-level organizational chart. Attitudes of mutuality and service to one another must undergird even the most technologically sophisticated enterprises. Career preparation for technicians, then must provide adaptive tools that will not require leaving an income stream to upgrade or to become re-educated.

The anxiety I feel, as I am sure others of you feel, is that of inadequacy for the task at hand. With rapid changes in the technology of agriculture, with heavy teaching loads, with so little time to do what we are already doing, what more can we do? As a faculty member, I am adviser to 30 students; I am in the classroom 20-30 hours per week; I supervise on-the-job training, advise clubs, work with advisory committees, recruit, place graduates, and on and on and on. We all advise, teach and try to maintain credibility.

How do we solve our problem? A number of ways do exist for us to try to keep up:

A. Industry advisory committees--seek their advice by being in their places of business often.

B. Keep active alumni groups going--keep in touch with our products.

C. On-the-job supervision of our students and on-site consultations with their supervisors.

D. Leaves of absence to work in the industry.

E. Supervision of the placement of our graduates.

We need support and incentives to modernize. Local college administrators can be of assistance by providing leaves with or without pay for specific work programs of our own. Recognition and salary improvements could also be successful incentives. Perhaps most important of all, is an industry that will go out of its way to get to know us and to provide reasonable opportunities for our involvement. Industry-college exchanges are possible.

There is an enormous task ahead of us, but, what man can conceive, he will achieve--with a little help from his friends!

Dr. James L. Gibson is an associate professor at the University of Minnesota Technical College, Waseca, Waseca, Minnesota.

REACTION PANEL: TECHNICAL COLLEGE ADMINISTRATOR

John J. Light

John Steinbeck in Grapes of Wrath describes three choices people have: migrate, mutate or die. We can choose to leave, or change, or we'll die.

There is no question that in the future there will be fewer programs. They will have to be better and there will be full articulation. Currently, agriculture is the most archaic when it comes to articulation. It's past time for agriculture to change this aspect.

There needs to be better entrepreneurship instruction. This is a right brain activity that is taught in the left brain mode. There are no opportunities to practice entrepreneurship in agriculture. In other industries there are large companies and corporations but there are also several small firms in which students can gain practice in making management decisions that affect profitability.

In the area of retraining employees or upgrading graduates, we need a quantum leap forward just to get up-to-date. In 1981 there was more training in private industry than there was in the public schools. The real problem lies in our inability to change. Rather than adapt our programs to meet the needs of business and industry we tell them what we will teach and how we will teach it. Often times our plan doesn't meet their needs. For us to correct the current image of technical education, we need to have an aggressive plan to develop retraining programs.

What we really need in agriculture is a world vision with foreign language instruction as a key ingredient. As we learn to work and market with people in other countries, it is unreasonable to expect them to understand English. It is crucial for us to be able to communicate in their language.

It's also essential that postsecondary technical education be articulated with the baccalaureate programs.

Dr. John J. Light is president of Hocking Technical College, Nelsonville, Ohio.

TECHNICAL SESSIONS

Concurrent sessions were conducted on technological developments in agriculture. Although each area has some specific differences, it is clear that agriculture is rapidly moving into a new era of applied basic biology and electronimcs.

Technicians of the twenty-first century will be expected to have the following qualifications:

A. Broad understandings of basic science.

B. Ability to communicate orally as well as in writing.

C. Knowledge of computer and robotic applications.

D. Up-to-date knowledge within the specific technical field.

E. Ability to analyze situations, adapt technology, and apply the most appropriate solution.

It will not be adequate to be competent with today's technology. The technicians role of the future will require people who are well-rounded individuals with a worldwide perspective and the ability to work with a wide variety of people and cultures.

The technical sesisons were conducted by the following industrial representatives:

Dr. Arthur Raun, director of animal science discovery research at Lilly Research Laboratories, Greenfield, Indiana.

Dr. James J. Peters, employment manager for The Andersons, Maumee, Ohio.

Dr. George McVey, senior technical associate at O. M. Scott and Sons, Marysville, Ohio.

Mr. Richard Smith, publicity staff assistant at Lincoln Electric Company, Cleveland, Ohio.

ARTICULATING TECHNICAL EDUCATION: FOUR-YEAR COLLEGE PERSPECTIVE

Bernard Erven

Joining together technical (two-year) and baccalaureate (four-year) education expectations will require us to:

1. Maintain the integrity of higher education (we cannot allow the deterioration of standards).

2. Not sacrifice the mission of the two-year program.

3. Establish programs for four-year graduates with no distinction of where the first year of their college career was completed.

4. Be sensitive to changing student goals, improved self-awareness of ability, and changing career goals or plans that occur during the 18-22 year age period.

5. Recognize articulation as a lifetime concern, not an 18-22 year age group problem.

6. Promote articulation in a sense of cooperation, not competition, between the two-year and four-year institutions.

The root causes of problems in articulation are:

1. Misunderstanding the differences of mission by both educational groups: technical education emphasis the "how" and "now"; baccalaureate education focuses on professional and liberal education, with more theory and less practical, and with emphasis on "why," "if" and to a limited extend "how."

2. Differing vantage points which interfere with clearly distinguishing between different programs. The three major points are students, two-year college administrators and faculty and four-year college administrators and faculty.

3. The mechanism of transfer--the bureaucracy of articulation creates major problems.

4. The major differences in judgement and expectations among faculty and administrators. Often it involves opinion versus analysis.

5. The four-year institutions have been too generous over the years, thereby sending inappropriate signals to the two-year colleges and their students.

6. Competition between institutions for student enrollment.

7. Young people are changing but reluctant to pay the price for that change.

8. Baccalaureate programs in agriculture are too narrow and traditional to be responsive to today's needs. Technical education can do better at preparing students in several areas.

My program for improving articulation would include:

1. A close working relationship between the two-year and four-year administrators and faculty.

2. Clear statements of agreement on content of courses that should transfer.

3. Computerize all transfer matrices to minimize the role of the individual transfer student visiting individual faculty to negotiate transfer credits.

4. Require a minimal amount of general studies and agricultural studies at the four-year institution.

5. Clearly written policies available for students at the two-year and four-year institutions.

Dr. Bernard Erven is a professor in the Department of Agricultural Economics and Rural Sociology at The Ohio State University, Columbus, Ohio.

ARTICULATING TECHNICAL EDUCATION: TWO-YEAR COLLEGE PERSPECTIVE

Larry L. Statler

We need focus on high technology and the student by recognizing that:

1. High technology is not all new and completely predictable. We can't dabble in "high tech devices" and call it our "high tech curriculum."

2. High technology is changing rapidly and involves using computers and other electronic devices. Knowing the "why" as well as the "how" will be required through general support courses that teach principles.

3. Clear career goals and objectives do not exist on the part of our students.

The role of two-year colleges is to:

1. Provide a genuine career selection.

2. Develop a strong sense of self worth within the individual.

3. Convince our students that education makes a difference in the marketplace.

4. Create a "comfort zone" for students as they associate with campus life.

5. Impress students that the world of work is changing and they should not be too narrow and be locked in.

The role of four-year colleges is to:

1. Provide opportunities to build on career goals and education gained at the two-year level.

2. Provide a way for students to change career goals.

3. Continue to develop with the student a sense of trust in higher education.

4. Continue to provide an assortment of job ready skills to each student.

5. Educate the "whole" student.

Dr. Larry L. Statler is assistant dean for Agricultural Technologies at Kirkwood Community College, Cedar Rapids, Iowa.

ARTICULATING TECHNICAL EDUCATION: INDUSTRY PERSPECTIVE

Louis Hathaway

The performance of technicians is critical to:

1. His/her own successful career.
2. The profits of a dealership/company.
3. The customer and his/her satisfaction.

In educating the technicians, we need to recognize:

1. Articulation needs to begin at the elementary level and continue through community colleges and universities.
2. Articulation should eliminate unneeded duplication of instruction but needs to insure that graduates have reading, writing and mathematics skills. If they are passed at a level, they should not be admitted to the next level without passing entrance exams.
3. Poor curricula weaken the effectiveness of instruction.
4. Lack of articulation discourages outstanding people from entering technical college programs because of limited opportunities for transfer. Industry needs people with technical skills as well as academic learning. This requires career and education paths open to capable students.
5. If articulation is not accomplished, we may need to consider three-year technical curricula to adequately prepare the technicians, especially in agricultural machinery service careers.

Our industry needs good technicians and good teachers are needed to provide the quality of instruction necessary to produce the kind of technician needed.

1. George Bernard Shaw in Maxims for Revolutionists said, "He who can, does. He who cannot, teaches." Good teachers require the knowledge and skills of accepted teaching methods, a comprehensive knowledge of the subject matter, a strong desire to teach, excellent communication skills, and the ability to motivate students.
2. There are three kinds of postsecondary teachers in agriculture:
   a. Master teachers who are effective in all aspects;
   b. Academic teachers who can teach in the classroom, but do not have technical abilities to teach in the laboratory; and
   c. Technical teachers who are "technical consultants" but do not have the teaching methods to be effective in the classroom.

3. We need better in-service opportunities to develop the needed teaching skills. Some school administrators don't always support workshops conducted by industry; universities often don't offer the kind of in-service education needed by post-secondary faculty members. Universities could support and recognize industry workshops by providing college credit. Industry expects teachers to have a teaching degree and the technical competence to provide the proper education for student technicians.

Mr. Louis Hathaway is managing editor for service training, Deere and Company, Moline, Illinois.

MAJOR ADDRESS: TEACHING TECHNICIANS FOR THE 21ST CENTURY

William E. Drake

My objectives today are three-fold: First, I would like to examine the product of technical education--examine it as it arrives at the door of the technical college and as it graduates into the real world of technical work. That product, of course, is the two-year technical college student. Secondly, I would like to briefly examine the process of technically educating and training these products in a way that truly makes a difference. I used both "training" and "educating" and that was intentional, because I think we train for the short-time specialized purpose and we educate over the long haul so that our products when they go away from us may change as the technical demands of their occupations cause them to change. Thirdly, I wish to express commendations and concerns or cautions and then charge you with the task that lies ahead in the twenty-first century.

First, allow me to deal with our product, those individuals who come to us in the hope of preparing for successful careers in technology. I have always believed that it's extremely important to know "who's coming to class." Let's examine some demographics regarding this product. Let's take a brief look at who comes to class. These data are from our two-year colleges, the agricultural and techncial colleges in New York State. As I look at the data regarding this product, the "N" will be 3,185 students.

Let me first look at gender. Fifty-seven percent are male; 43 percent of the two-year agricultural and technical college students are female. The trend is an increasing number of female students. If we examine age, we find they are 18 to 20 years of age. The trend: they are becoming older. We are receiving an older student.

Racial background: the students at the agricultural and technical colleges are predominantly caucasian. The trend is an increase in the number of students from minority groups. The political orientation of the students: they are middle-of-the road. There are equal numbers of liberal and conservative, few are far right, and few are far left.

Their grades in high school: about 18 percent had B+ averages and about 34.5 percent had B averages. About 17 percent had B-averages, and 15.8 percent had C+. Only 2.8 percent had an A average, and this is descriptive of the academic ability of the students at the two-year technical college level. Their rank in their high school classes may be revealing: fifty percent were in the middle 20 percent of their high school class; 25 percent were in that second 20 percent.

The parental income: the largest group of the two-year colleges were in the income group of $15,000 to $30,000. Most attended public secondary schools of predominantly white students. However, there is an increasing frequency of private schools at the secondary level, and this is something we probably need to concern ourselves with. There seems to be a correlation between the financial ability to attend private schools and the intellectual capability of the students. If this is true, then the pool of students from which we receive our two-year technical college students, may over the long haul have less intellectual ability.

A further examination of the students who are our product at the two-year colleges will reveal that about 80 percent of them went to college because they thought it would result in a better job. Fifty-two percent of them chose their institution because graduates from that institution get good jobs, and 46 percent because it had a good reputation. Fifty percent of these students are Catholic, and 23 percent are Protestant.

Thirty-nine percent plan to go on for baccalaureate degree, and 70 percent believe that students should help evaluate faculty members. It might be interesting to add that 88 percent of these students drink beer. And 60 percent believe that having sex is okay if the people like each other.

How, then, should we describe this potential product? They are not the intellectual elite; they are not the intellectual giants coming through the system. Nor are they the dummies of the system. They are extremely job-oriented, and I think this is an important fact as we look at the pedagogy in the years ahead. Their socioeconomic level is middle class. They are middle-of-the-road in their political mentality. They are neither far right nor far left.

What are the trends, then, that we are likely to witness as we consider who's coming to class? Two-year college students will be older in the future. We now find a fairly significant number who have BA degrees but they are enrolling in the technical agriculture programs so they may find gainful employment. An increased number of racial minorities will probably be among the student group in the future. They will lack experiential background, and this will argue in the future for experiential education with laboratory facilities which are very much like the real world. We may see more disabled students. We are very likely to see an increase and frequency of students with special needs. We will probably see an increasing number of international students, and we may see more non-traditional students in the years ahead.

What is the need or demand, then, for technically-trained products? Currently, the agricultural industry, some 20 percent of our nation's gross national product, is threatened by a deepening shortage of

qualified technical and professional personnel. Shortages are predicted to be especially critical in the next 10 or 15 years. There will be 25 percent fewer people in the college-age group in the immediate future. Enrollment in colleges of agriculture has already declined 15 percent in the last four years. As I check with the two-year college placement offices, I am told that the shortage of technically-trained persons in agriculture is continuing.

And, now, the second phase of my intended mission. I will look at the process of preparing technicians. Let me refine somewhat the demographic profile just presented. Because we need to examine our product as learners, I have been observing their learning styles over a period of years. First, let us look at the conditions of learning. They are very mixed or heterogenous in their makeup. Peer relations are important to them as students. Content organization is somewhat important. They are very concerned with goal setting, and they are not as competitive as some students. Probably students with higher cumulative averages are more competitive. They find a great deal of importance in relating their instruction to the world of work. If we look at their content orientation, we must consider their attitude toward numeric or numbers content, the qualitative, verbal or word content, and the inanimate or things and objects content. We find that the two-year agricultural technical students are quite inanimate in their desire for content. They like things and objects. In other words, they believe in preparing for real activity. They are quite people-oriented, and they prefer to work with other persons.

If we examine the learning modes, and I will rank them somewhat, direct experience seems to be their first choice in a mode of learning. They are quite iconic, or they like illustration, and this would argue for very careful selection of the strategies we use in teaching. They are not as interested in reading as a mode of learning, although they are quite interested in listening as a mode of learning. As we deal with the non-traditional two-year students older than 22, we must be very much aware of some non-cognitive factors that will affect their learning. Motivation becomes extremely important with the older student at the technical college level. They must be motivated.

Anxiety is another non-cognitive factor that we must consider. Older students become anxious because they are quite afraid they may not "look good" and they may not learn as well as is expected. There is a certain cautiousness in an older learner, and they must be made to feel at ease. There is a speed factor. We know that "old dogs can learn new tricks." We know that older, non-traditional learners have excellent ability to learn. However, there is a speed factor, and we may find that it takes these learners just a little longer to learn.

Now, a quick look at curriculum. As we look at the curriculum, I would like to define curriculum as "a structured series of intended learning outcomes." And I would like to state those intended learning outcomes for technical preparation as performance objectives. I think of instruction as bringing about three kinds of observable behavioral change. The cognitive or informational kind of change, the psychomotor skills type of change, and the affective or the attitudinal type of change.

I would suggest that an analytical approach to determining learning outcomes is absolutely essential. Functions and task analysis, backed up with the concepts and principles underlying those functions and tasks, seems a very vital way to determine what the curriculum should be, what the intended learning outcomes should be, and what the performance behaviors of the learners should be. This approach is essential for initial employment because the products of the technical program must be able to hit the ground running and perform well immediately when they get on the job.

There is a third dimension that must be recognized in the pedagogy of the twenty-first century. Our products must learn how to learn. Our products, these technically-prepared students, must learn to educate themselves as they continue on in their careers and as the technology of their careers changes. And, so, we must think about knowledge organization and such strategies as concept mapping.

I could ask how many of you knew at the age 18 or 19 that you would be doing what you are doing now. And usually when that question is asked, there are no persons present who really knew at the age of 18, 19 or even 20 what they would be doing later on in their careers. It follows then that the college teacher as a counselor will become increasingly important.

Another factor that we must consider in the near future, and it's already with us, is the application of technology to instruction. Educational technology will probably lag behind the biotechnology field. In New York we are finding that with growth hormones, the production of a dairy cow can be increased about 40 percent. Centainly, there is a great deal of education that must go on if the dairy industry is able to accept

this kind of increased production. Dale Bachman's research at Cornell could revolutionize dairy production. At the same time it will have a tremendous economic impact on that industry, and this must be taken into consideration.

Computer-assisted instruction is with us. Computer-managed instruction is with us. Interactive video offers some opportunities for institutions to trade instruction. "Technoshock" is a reality. "Technostress" is also a reality and the result of the fast technology change. Two basic forms of technostress seem to be at play. Those who reject technology feel anxiety. The "technoanxious" persons feel threatened. The "technocentered" person identifies so closely with the technology such as the microcomputer that it nourishes even the emotions. And so, whether we love it or we hate it, we can be the loser with technology.

And, finally, the third phase of my comments: allow me to commend you, to caution you, and to charge you. First, let me commend you for the applied nature of your curricula and the quality of teaching that exists at your institutions. You make it tough for the four-year faculty because you set an excellent pace in the quality of instruction for the two-year student. Let me commend you for having the kind of impact that causes students to strive for their maximum performance. I could point to many, many students I have worked with in the four-year university who were told they could never make it. They were told by guidance counselors they shouldn't plan to go on; they wouldn't be able to cut it in academia. They went to the two-year college; they found their niche. They got turned on, and they have succeeded. Let me commend you for your dedication, to your disciplines or your subjects, but mostly to your student.

And let me caution you. Watch out for the movement from cultural shock to future shock to "technoshock." Even if we don't travel rapidly from place to place, the world around us is changing so fast that unless we change we suffer confusion, disorganization, and disorientation. Anthropologists call it culture shock. Toeffler in his book called Future Shock, and then in the Third Wave, described an even greater kind of needed adjustment. And now we encounter this thing called "techno-shock." We can no longer get through a working life span on a single set of skills. It is no longer sufficient to teach people to earn a living. Rather, they must now be taught to learn a living. In addition to learning skills and knowledge, our students must now learn how to learn.

A special caution to administrators would be that you fight for the faculty in your institution; that you support high quality performance; and that you evaluate ruthlessly. You cannot afford operational fat, inferior performance, or even mediocrity. Accept the fact that technical education costs more than the academics. My charge to you would be break with tradition. Get rid of the sacred cows, but watch your standards. Do not let reduced numbers scare you into sacrificing quality, and specialize with caution. We have all seen institutions that specialize too much. Be analytical in your curricular decisions. Use experiential education as a primary strategy, and check your product. Follow those products as they go into the world of employment.

I would summarize by saying that you must break with tradition; you must change often; and you must get rid of some of those sacred cows that are being protected in your institutions. As someone said, "If you really want to make a good omelet, you have to break a few eggs."

In closing, let me plagiarize the words of Bob Mager,

"There once was a teacher whose principal feature was hidden
in quite an odd way.
Students by millions and possibly zillions surrounded him
all of the day.
When finally seen by his scholarly dean and asked how he
managed this deed; he lifted three fingers and said,
"All you swingers, need only to follow my lead.
To go from a zero to big campus hero, to answer these
questions you'll strive.
Where am I going? How shall I get there? And how will
I know I've arrived?"

Where am I going?, means an analytical approach to designing curriculum. It means determining those intended learning outcomes and putting them into performance objectives based on the real demands of real jobs. How shall I get there?, means a very careful selection of stragtegies. And, I am suggesting that the strategies of placement for work experience and experiential education, in realistic simulated laboratories is going to be important. And how will I know I've arrived? simply means we must evaluate that product as it enters the world of work. We must follow up often to see whether those products of our institutions are really doing the job at the technical level.

Dr. William Drake is professor and chairman of Agricultural and Occupational Education and acting chairman of the Department of Education at Cornell University, Ithaca, New York.

DEVELOPING ACTION PLANS: TECHNICAL COLLEGE FACULTY

Ms. Linda Houston, Discussion Leader

Dr. Kirby Barrick, Recorder

The primary concerns facing faculty as they prepare for the twenty-first century are staying up-to-date with technological change and teaching the appropriate subject matter using the proper teaching methods for the students learning styles. We need improved interaction between faculty and industry people. This can be accomplished through a wide range of internship type experiences for faculty or exchanges where college faculty go to industry for short periods while an industry person teaches a class at the college.

An increased emphasis needs to be given to learning styles. Faculty need help in analyzing learning styles and developing prescriptive activities to provide the proper instruction. There is a constant need for variety in teaching methods but we also need to emphasize to students that learning is a combination of study and work. Experiential education and teaching methods must continue to be emphasized at the technical colleges. Greater encouragement is needed from the technical college administrators for peer observations and sharing of techniques with less emphasis on peer evaluation.

Advisory committees composed of industry representatives need to be established and utilized in keeping course content and curricula relevant to the needs of industry. By rotating membership, advisory committees also provide a vehicle for improved articulation between industry and faculty. The changing needs of skills and abilities need constant communication between industry and education.

Ms. Linda Houston is associate professor and coordinator of communication skills at The Ohio State University Agricultural Technical Institute, Wooster, Ohio.

Dr. Kirby Barrick is an associate professor in the Department of Agricultural Education, The Ohio State University, Columbus, Ohio.

DEVELOPING ACTION PLANS: TECHNICAL COLLEGE ADMINISTRATORS

Dr. George Waldheim, Discussion Leader

Dr. Lowell Hedges, Recorder

Strategies need to be developed for maintaining or increasing student enrollments. As part of this, we need to better portray the "real" image of agriculture, recognize there will be more part-time students in the future, and emphasize that technical education is the thirteenth and fourteenth years of school.

Consideration must be given to changing "menus" or "tailoring" programs for students. Each program should have its own standards and criteria for completion (e.g., three years with 140 credit hours vs. two years with 105 hours). At the same time we need to be more creative in using people and facilities in delivering instruction. Seven days a week for fewer weeks may be the format for industry in-service classes. Merging resources by sharing personnel and facilities between education and industry will also be expected in the future. Not all learning will be (nor is it now) done by abstract thinking. Program development must consider student learning styles as well as their interests and desires.

Funding will continue to be a problem. The technical college adminstrators need to be better aware of and take advantage of current funding sources for special programs (e.g., adult and continuing education, faculty development, etc.). Future budgets need to provide for individual program and student differences and encourage innovative teaching methods and program design. Instruction will be taken to the industrial locations to utilize the state-of-the-art equipment rather than have colleges purchase the needed equipment.

Faculty development needs to have special emphasis as we prepare for the twenty-first century. Industry sponsored workshops on technology change need to be developed at the same time colleges develop special pedagogical courses for new faculty who have industrial experience. In general, administrators need to develop more flexibility in faculty time assignments to provide for on-going development and interaction with industry.

Dr. George Waldheim is dean of the Division of Business, Engineering and Science at Muskingum Area Technical College, Zanesville, Ohio.

Dr. Lowell Hedges is an associate professor in the Department of Agricultural Education at The Ohio State University, Columbus, Ohio.

DEVELOPING ACTION PLANS: TEACHER EDUCATORS

Dr. Richard Welton, Discussion Leader

Dr. Barbara Malpiedi, Recorder

Teacher educators have two roles in improving technical agricultural instruction for the twenty-first century: conducting research for the technical colleges and preparing personnel (faculty and administrators) for the technical colleges.

Research activities should include establishing base data describing the characteristics of technical colleges and their students. Research could be conducted to help technical colleges constantly update their role and mission, articulate their needs to their various constituencies, develop appropriate in-service programs for faculty, and identify employer expectations of graduates.

In this mutual relationship, the teacher educators should develop in-service programs for current faculty members who need assistance with pedagogical skills. As part of their research, teacher educators can also assist by developing new teaching techniques and instructional materials and preparing faculty to use them. There is also an opportunity to provide pre-service education at the masters or doctoral degree level for those individuals who aspire to teach and/or administer at the technical college level.

The teacher education role is not limited to departmental activity but also could include liaison activities with other departments in colleges of agriculture.

Dr. Richard Welton is professor and coordinator of agricultural education in the Vocational Education Department at Kansas State University

Dr. Barbara Malpiedi is an assistant professor in the Department of Agricultural Education at The Ohio State University, Columbus, Ohio.

CONFERENCE SUMMARY

J. David McCracken

This conference was an excellent first step toward improving our technology, articulation, teaching, and planning for twenty-first century agricultural education at our technical and community colleges. Some key points were: we are a profession in need of academicians as well as technicians; we lack an innovative vision and missionary zeal; we in education are rapidly falling behind the technological change that is occurring; we need to maintain the integrity and missions of our institutions as we improve articulation; we need to develop more of a sense of cooperation rather than competition between two and four-year institutions; our postsecondary students are not intellectual giants (as we might expect) but our teaching strategies need to be designed to help them develop a desire for life-long learning.

The planning we started at this conference must not stop. We each must go home to establish an agenda for change. This change must be based on the needs of industry in your states and even your individual communities. So there can be no master plan because there are too many variables between regions, state policies, organizational procedures, and institutional needs. However, it is extremely critical for all future planning to involve educators, industry representatives, and the general public. In that sense this conference established an excellent model for involving industry and education. Planning is a "give and take" process in which all of us must be "givers" instead of "takers." Now, the work begins as we go home to implement what we've learned here.

Dr. David McCracken is a professor in the Department of Agricultural Education at The Ohio State University, Columbus, Ohio.